

CLAIMS

1. A method for cleaning in an automated milking system (9) comprising a plurality of teat cups (19), each of which is connected to a respective milk line, wherein, during milking of a milking animal, the plurality of teat cups are attached to the teats of the animal, and vacuum is supplied to the respective milk lines in order to draw milk from the teats of the milking animal, characterized by the steps of:

5 - removing milk or other residues present at each of said plurality of teat cups (19) by means of flushing (37) each of said plurality of teat cups with a cleaning fluid supplied via a first supply line (36, 34c);

10 - evacuating cleaning fluid from each of said plurality of teat cups (19) or from the first supply line (36, 34c); and

15 - disinfecting at least one of said plurality of teat cups by means of exposing (60) said at least one of said plurality of teat cups to steam.

2. The method of claim 1 wherein said step of evacuating cleaning fluid is performed prior to said step of disinfecting at least one of said plurality of teat cups.

3. The method of claim 1 wherein said step of evacuating cleaning fluid is performed subsequent to said step of disinfecting at least one of said plurality of teat cups.

4. The method of any of claims 1-3 wherein each of said plurality of teat cups is flushed internally and externally with said cleaning fluid supplied via a first supply line.

25 5. The method of any of claims 1-4 wherein said cleaning fluid is water, a mixture of water and air, or a cleaning detergent.

6. The method of any of claims 1-5 wherein each of said plurality of teat cups is held in a downwards direction while being flushed with said cleaning fluid to prevent said cleaning fluid from flowing into the milk line, to which the teat cup is
5 connected.
7. The method of any of claims 1-6 wherein cleaning fluid is evacuated from each of said plurality of teat cups or from the first supply line by means of supplying vacuum to said first supply line.
- 10 8. The method of any of claims 1-7 wherein said step of disinfecting said at least one of said plurality of teat cups further comprises the step of exposing said at least one of said plurality of teat cups to radiation, particularly UV light radiation.
- 15 9. The method of any of claims 1-8 wherein said steam, to which said at least one of said plurality of teat cups is exposed in the step of disinfecting, is supplied through a second supply line (67, 62) separate from said first supply line.
- 20 10. The method of claim 9 wherein the first supply line is provided with a plurality of smaller orifices (34d) in radial or tangential directions, through which the cleaning fluid is ejected (37) as a plurality of jets for flushing each of said plurality of teat cups in the step of removing milk or other residues, while the second supply line is provided with a larger orifice (60), through which the steam can be exiting (63) in the step of disinfecting to quickly heat said at least one of said plurality of teat cups.
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11. The method of claim 9 or 10 wherein said automated milking system comprises a washing system (61) for washing surfaces of

the automated milking system exposed to milk, including the plurality of teat cups and the milk lines connected thereto, at a regular basis, where said second supply line (62) is connected to a tank of the washing system for collecting 5 washing liquid collected through the plurality of teat cups or for supplying washing liquid to the automated milking system through the plurality of teat cups, the method including the step of:

- disconnecting said tank from the plurality of teat cups prior 10 to the step of disinfecting said at least one of said plurality of teat cups.

12. The method of any of claims 9-11 wherein vacuum is supplied to said second supply line prior and/or subsequent to the step of disinfecting said at least one of said plurality of teat 15 cups.

13. The method of any of claims 1-12 further comprising the step of cooling said disinfected at least one of said plurality of teat cups by means of flushing said disinfected at least one of said plurality of teat cups with a cooling fluid.

20 14. The method of claim 13 wherein said cooling fluid is water, preferably tempered water.

15. The method of claim 13 wherein said cooling fluid is a gas.

16. The method of any of claims 13-15 wherein said step of cooling said disinfected at least one of said plurality of teat 25 cups is performed to lower the temperature of said disinfected at least one of said plurality of teat cups to a temperature of 25-45°C, more preferably 30-40°C, and most preferably about 35°C.

17. The method of any of claims 13-16 wherein said cooling fluid is supplied to said disinfected at least one of said plurality of teat cups through said first supply line (36, 34c).

18. The method of any of claims 1-17 wherein said automated milking system comprises a teat-cleaning device (27; 25) for cleaning each of the teats of the milking animal prior to the respective teat being attached to a respective one of the plurality of teat cups for milking, and said method further comprises the step of:

10 - disinfecting said teat-cleaning device (27; 25) subsequent to the cleaning of at least one of the teats of the milking animal by means of exposing said teat-cleaning device to steam.

19. The method of claim 18 wherein said teat cleaning device (27) comprises brushes for brushing each of the teats of the 15 milking animal.

20. The method of claim 18 or 19 wherein said teat cleaning device comprises a teat cleaning cup (25), to which each of the teats of the milking animal is attached in sequential order to be cleaned, and wherein said teat cleaning cup is disinfected 20 subsequent to the cleaning of each one of the teats of the milking animal.

21. The method of claim 18 or 19 wherein said teat cleaning device comprises a plurality of teat cleaning cups, to which the teats of the milking animal are attached to be cleaned, and 25 wherein at least one of said plurality of teat cleaning cups is disinfected subsequent to the cleaning of the teats of the milking animal.

22. The method of any of claims 1-21 wherein said automated milking system comprises a robot arm (18) provided with a

gripper (18a) and an optical sensing means (18b), wherein, prior to milking the milking animal, the plurality of teat cups are gripped by said robot arm gripper, and moved and attached to the teats of the animal with aid of said optical sensing means, said 5 method further comprising the step of:

- disinfecting at least a portion of said robot arm provided with said gripper and said optical sensing means.

23. An arrangement for cleaning in an automated milking system (9) comprising a plurality of teat cups (19), each of which is 10 connected to a respective milk line, wherein, during milking of a milking animal, the plurality of teat cups are attached to the teats of the animal, and vacuum is supplied to the respective milk lines in order to draw milk from the teats of the milking animal, characterized in:

- 15 - a cleaning member (34c) connected to a supply (35) of cleaning fluid by means of a first supply line (36) for flushing (37) each of said plurality of teat cups (19) with a cleaning fluid in order to remove milk or other residues present at each of said plurality of teat cups;
- 20 - means for evacuating cleaning fluid from each of said plurality of teat cups (19) or from the first supply line (36, 34c); and
- a steam generator (66) for exposing (60) at least one of said plurality of teat cups to steam in order to disinfect said at 25 least one of said plurality of teat cups.

24. The arrangement of claim 23 wherein the means for evacuating is adapted to evacuate cleaning fluid prior to exposing (60) at least one of said plurality of teat cups to steam.

30 25. The arrangement of claim 23 wherein the means for evacuating is adapted to evacuate cleaning fluid subsequent to exposing (60) at least one of said plurality of teat cups to steam.

26. The arrangement of any of claims 23-25 comprising a source of radiation, particularly UV light radiation, for exposing said at least one of said plurality of teat cups to radiation.
27. The arrangement of any of claims 23-26 comprising a second supply line (67, 62) separate from said first supply line, said second supply line connecting said steam generator (66) and said cleaning member (34c).
28. The arrangement of claim 27 wherein the first supply line is provided with a plurality of smaller orifices (34d) in radial or tangential directions, through which the cleaning fluid is ejectable (37) as a plurality of jets for flushing each of said plurality of teat cups, while the second supply line is provided with a larger orifice (60), through which the steam exits (63) to quickly heat said at least one of said plurality of teat cups.
29. The arrangement of claim 27 or 28 wherein said automated milking system comprises a washing system (61) for washing surfaces of the automated milking system exposed to milk, including the plurality of teat cups and the milk lines connected thereto, at a regular basis, where said second supply line (62) is connected to a tank of the washing system and is provided with a shut off valve (68) for disconnecting said tank from the plurality of teat cups prior to exposing said at least one of said plurality of teat cups to steam.
30. The arrangement of any of claims 27-29 comprising a vacuum source for supplying vacuum to said second supply line prior and/or subsequent to exposing said at least one of said plurality of teat cups to steam.

31. The arrangement of any of claims 23-30 further comprising a source of cooling fluid for supplying cooling fluid to said at least one of said plurality of teat cups subsequent to exposing said at least one of said plurality of teat cups to steam.

5 32. The arrangement of claim 31 wherein said cooling fluid is water, preferably tempered water, or a gas, and wherein the supply of cooling fluid to said at least one of said plurality of teat cups lowers the temperature of said at least one of said plurality of teat cups to a temperature of 25-45°C, more preferably 30-40°C, and most preferably about 35°C.
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15 33. The arrangement of any of claims 23-32 wherein said automated milking system comprises a teat-cleaning device (27; 25) for cleaning each of the teats of the milking animal prior to the respective teat being attached to a respective one of the plurality of teat cups for milking, and said arrangement is further adapted to expose said teat-cleaning device to steam in order to disinfect said teat-cleaning device (27; 25).

20 34. The arrangement of claim 33 wherein said teat cleaning device (27) comprises brushes for brushing each of the teats of the milking animal.

25 35. The arrangement of claim 33 or 34 wherein said teat cleaning device comprises a teat cleaning cup (25), to which each of the teats of the milking animal is attached in sequential order to be cleaned, and wherein said teat cleaning cup is disinfected subsequent to the cleaning of at least one of the teats of the milking animal.

36. The arrangement of any of claims 23-35 wherein said automated milking system comprises a robot arm (18) provided with a gripper (18a) and an optical sensing means (18b),

wherein, prior to milking the milking animal, the plurality of teat cups are gripped by said robot arm gripper, and moved and attached to the teats of the animal with aid of said optical sensing means, said arrangement further comprising means for 5 disinfecting at least a portion of said robot arm provided with said gripper and said optical sensing means.

37. The arrangement of any of claims 23-36 wherein said steam generator (66) comprises:

- a water tank (71) for storing an amount of water;

10 - means (72a-d) for regulating a flow of water from said water tank;

- a chamber (73) for receiving said flow of water, said chamber being capable of housing only a fraction of said amount of water;

15 - heating means (74a-c) for generating steam from water housed in said chamber; and

- an output line (75) for outputting said generated steam.

38. The arrangement of claim 37 wherein said water tank and said chamber are mutually located to cause said flow of water by 20 means of gravity.

39. The arrangement of claim 37 comprising a pump to cause said flow of water.

40. The arrangement of any of claims 37-39 wherein said means for regulating said flow of water includes a valve.

25 41. The arrangement of any of claims 37-40 wherein said means for regulating said flow of water includes a nonreturn valve

(72a) connected to prevent water or steam from passing from said chamber to said water tank.

42. The arrangement of any of claims 37-41 wherein said means for regulating said flow of water includes a temperature-controlled valve (72b) connected to prevent water from flowing from said water tank to said chamber if a temperature of said chamber is below a selected temperature and to allow water to flow from said water tank to said chamber if said temperature is above said selected temperature.

10 43. The arrangement of any of claims 37-42 wherein said steam generator is designed such that water flowing from said water tank to said chamber is essentially momentarily evaporated.

15 44. The arrangement of any of claims 37-42 wherein said steam generator is designed such said chamber is at least partly filled with water during use of said steam generator.

45. The arrangement of any of claims 37-41 wherein

- said means for regulating said flow of water includes a controllable valve (72c) controlled to regulate said flow of water to repeatedly fill said chamber with water; and
- 20 - said heating means and said output line are adapted to repeatedly generate and output steam from water housed in said chamber.

25 46. The arrangement of any of claims 37-45 wherein said heating means includes a heating element (77) held at high temperature during use.

47. The arrangement of any of claims 37-46 wherein said heating means includes an electrical heater (76, 74c).

48. The arrangement of any of claims 37-47 wherein said output line for outputting said generated steam is provided with a pressure-controlled valve (72d), which opens at a selected pressure.

5 49. The arrangement of any of claims 37-48 wherein said water tank is provided with a level indicator (78) and is connected to a water supply unit (79), which water supply unit (79) is adapted, with aid of said level indicator (78), to supply water to said water tank to keep said amount of water in said water tank essentially unchanged.

10 50. An arrangement for automatically disinfecting or sterilizing at least a portion of any of a resting, a milking, or a feeding station (9, 33a, 33b) located in an area (1), in which milking animals are allowed to move,
15 characterized in:

- a water tank (71) for storing an amount of water;
- means (72a-d) for regulating a flow of water from said water tank;
- a chamber (73) for receiving said flow of water, said chamber being capable of housing only a fraction of said amount of water;
- heating means (74a-c) for generating steam from water housed in said chamber or for heating water housed in said chamber; and
- an output line (75) for directing said generated steam or heated water towards said at least portion of any of a resting, a milking, or a feeding station to thereby disinfect or sterilize said at least portion of any of a resting, a milking, or a feeding station.

51. The arrangement of claim 50 wherein said any of a resting, a milking, or a feeding station includes a milking station (9); and said at least portion thereof includes a respective teat receiving opening of each teat cup (19) of the milking station, 5 or a respective teat receiving opening of each teat cleaning cup (25) of the milking station.

52. The arrangement of claim 50 or 51 wherein said water tank and said chamber are mutually located to cause said flow of water by means of gravity.

10 53. The arrangement of any of claims 50-52 wherein said means for regulating said flow of water includes a nonreturn valve (72a) connected to prevent water or steam from passing from said chamber to said water tank.

15 54. The arrangement of any of claims 50-53 wherein said means for regulating said flow of water includes a temperature-controlled valve (72b) connected to prevent water from flowing from said water tank to said chamber if a temperature of said chamber is below a selected temperature and to allow water to flow from said water tank to said chamber if said temperature 20 is above said selected temperature.

55. The arrangement of any of claims 50-54 wherein said steam generator is designed such that water flowing from said water tank to said chamber is essentially momentarily evaporated.

25 56. The arrangement of any of claims 50-55 wherein said steam generator is designed such said chamber is at least partly filled with water during use of said steam generator.

57. The arrangement of any of claims 50-53 wherein

- said means for regulating said flow of water includes a controllable valve (72c) controlled to regulate said flow of water to repeatedly fill said chamber with water; and

5 - said heating means and said output line are adapted to repeatedly generate and output steam from water housed in said chamber.

58. The arrangement of any of claims 50-57 wherein said heating means includes a heating element (77) held at high temperature during use.

10 59. The arrangement of any of claims 50-58 wherein said heating means includes an electrical heater (76, 74c).

60. The arrangement of any of claims 50-59 wherein said output line for outputting said generated steam is provided with a pressure-controlled valve (72d), which opens at a selected
15 pressure.

61. The arrangement of any of claims 50-60 wherein said water tank is provided with a level indicator (78) and is connected to a water supply unit (79), which water supply unit (79) is adapted, with aid of said level indicator (78), to supply water
20 to said water tank to keep said amount of water in said water tank essentially unchanged.